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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,737	07/30/2003	Masato Yamada	SUG-169-USAP	8922

28892 7590 01/27/2005

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EXAMINER	
LEWIS, MONICA	
ART UNIT	**PAPER NUMBER**
2822	

DATE MAILED: 01/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/629,737	YAMADA ET AL.	
	Examiner	Art Unit	
	Monica Lewis	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) *31,35,37,43 and 47-53* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,33,39,41 and 45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/2/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45 and 47-53.

DETAILED ACTION

1. This action is in response to the amendment filed October 26, 2004.

Election/Restrictions

2. Applicant's election without traverse of Embodiment II in the reply filed on 10/7/04 is acknowledged.

3. Newly submitted claims 31, 35, 37, 43 and 47-53 are directed to an invention that is independent or distinct from the invention originally claimed. Applicant made an election without traverse of Embodiment II on 10/7/04.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 31, 35, 37, 43 and 47-53 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: a) 71 (See Figure 22); b) 174 (See Figure 22); c) 11 (See Figure 22); d) 21 (See Figure 22); e) 30 (See Figure 24); f) 12107531 (See Figure 24); and g) 151 (See Figure 25). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement

Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because of the following: a) reference characters 111 and 121 have been used to designate both voltage conversion portions and power source circuits (For Example: See Page 43 Line 8 and Page 46 Line 15); b) reference character 99 has been used to designate both voltage conversion portion and AC/DC converter (For Example: See Page 43 Line 8 and Page 46 Line 6); c) reference characters 61 and 61 have been used to designate both incoming terminals and anode terminals (For Example: See Page 44 Line 11 and 21). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

6. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

7. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 33, 39, 41 and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the following: a) "an emission intensity of 5% of more of a reference intensity" (See Claim 1); b) "the well layers have a depth of a well" (See Claim 11); and c) "repetitive units" (See Claims 19 and 21). Claims 3, 5, 7, 9, 13, 17, 23, 25, 27, 29, 33, 39, 41 and 45 depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, second paragraph for the reasons set above.

10. Claim 19 recites the limitation "the repetitive unit." There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29 and 45, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Koike et al. (U.S. Patent No. 6,620,643).

In regards to claim 1, Koike discloses the following:

a) a light emitting device causing emission output of a light having a pseudo-continuous spectrum obtained by synthesizing a plurality of emissions differing in peak wavelength over a wavelength region of 50 nm or more, the reference intensity being defined as an emission intensity at a peak wavelength in the synthesized spectrum (For Example: See Figure 2 and Column 8 Lines 59-64).

In regards to claim 1, Koike fails to disclose the following:

a) an effective wavelength region showing an emission intensity of 5% or more of a reference intensity.

However, the applicant has not established the critical nature of an effective wavelength region showing an emission intensity of 5% or more of a reference intensity. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

In regards to claim 3, Koike discloses the following:

a) a double hetero light emitting layer portion composed of compound semiconductors, the double hetero light emitting layer portion having an active layer (160) comprising a plurality of emission unit layers (161B, 161G, 161G) differing from each other in band gap energy, and the emission output of the light having a pseudo-continuous spectrum is ascribable to a combination of light emission from the individual emission unit layers (For Example: See Figure 1, Figure 2 and Column 8 Lines 59-64).

In regards to claim 5, Koike discloses the following:

a) the emission unit layers comprise well layers each of which is sandwiched by two barrier layers (For Example: See Column 5 Lines 1-3).

In regards to claim 7, Koike discloses the following:

a) emission intensity of the emission unit layer is adjusted based on thickness and/or the number of the well layers (For Example: See Column 3 Lines 64-67).

In regards to claim 9, Koike discloses the following:

a) the well layers, which contribute to a wavelength region where a larger emission intensity is attained in the pseudocontinuous spectrum, are disposed in a larger thickness and/or the number of layers (For Example: See Column 3 Lines 64-67).

In regards to claim 11, Koike discloses the following:

a) the well layers have a smaller depth of well in the emission unit layer causative of a shorter emission wavelength (For Example: See Column 3 Lines 64-67, Column 4. Lines 1-30 and 60-67).

In regards to claim 13, Koike discloses the following:

a) the well emission unit layer has a quantum well structure (For Example: See Abstract).

In regards to claim 15, Koike discloses the following:

a) the emission intensity of the emission unit layer having the quantum well structure is adjusted by the number of layers of the well layers (For Example: See Column 3 Lines 64-67).

In regards to claim 17, Koike discloses the following:

a) the well layers have a smaller thickness in the emission unit layer causative of a shorter emission wavelength (For Example: See Column 3 Lines 64-67, Column 4 Lines 1-30 and 60-67).

In regards to claim 19, Koike discloses the following:

a) the double hetero light emitting layer portion is designed so that the main surface thereof on one side of the stacking direction serves as a light extraction surface, and so that the emission unit layer in the repetitive unit causative of longer emission wavelength is disposed more further from the light extraction surface in the thickness-wise direction of the active layer (For Example: See Column 4 Lines 24-30).

In regards to claim 21, Koike discloses the following:

a) a plurality of repetitive units, each of which being assumed as comprising a plurality of the emission unit layers differing from each other in the emission wavelength, are formed in a plural number in the thickness-wise direction of the active layer (For Example: See Figure 2 and Column 8 Lines 59-64).

In regards to claim 23, Koike discloses the following:

a) the double hetero light emitting layer portion is designed so that the main surface thereof on one side of the stacking direction serves as a light extraction surface, and so that the emission unit layer causative of a longer emission wavelength in each of the repetitive unit is disposed more further from the light extraction surface in the thickness-wise direction of the active layer (For Example: See Column 4 Lines 24-30).

In regards to claim 25, Koike fails to disclose the following:

a) the plurality of emission unit layers are aligned according to an order of magnitude of the band gap energy such as ensuring a difference of 0.42 eV or less between every adjacent band gap energies.

However, the applicant has not established the critical nature of the plurality of emission unit layers are aligned according to an order of magnitude of the band gap energy such as ensuring a difference of 0.42 eV or less between every adjacent band gap energies. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d

1934 (Fed. Cir.1990). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

In regards to claim 27, Koike discloses the following:

a) the effective wavelength region of the pseudo-continuous spectrum is synthesized by four or more emission unit layers differing in emission wavelength from each other (For Example: See Column 8 Lines 57-64).

In regards to claim 29, Koike fails to disclose the following:

a) the pseudo-continuous spectrum has a ripple ratio of 0.1 or less over the entire portion of the effective wavelength region.

However, the applicant has not established the critical nature of the pseudo-continuous spectrum having a ripple ratio of 0.1 or less over the entire portion of the effective wavelength region. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

In regards to claim 45, Koike discloses the following:

a) the pseudo-continuous spectrum contains no ultraviolet emission components having a wavelength of 350 nm or shorter (See Figure 1).

13. Claim 33, as far as understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Koike et al. (U.S. Patent No. 6,620,643) in view of Shakuda et al. (U.S. Patent No. 6,236,067).

In regards to claim 33, Koike discloses the following:

a) the effective wavelength region is ensured within a wavelength region from 550 nm to 670 nm (For Example: See Figure 2).

Additionally, the applicant has not established the critical nature of the effective wavelength region is ensured within a wavelength region from 550 nm to 670 nm. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

In regards to claim 33, Koike fails to disclose the following:

a) the double hetero light emitting layer portion is composed of $(Al_xGa_{1-x)y}In_{1-y}P$ (where, $0<x<1$ and $0<y<1$).

However, Shakuda et al. ("Shakuda") discloses the use of a double hetero light emitting layer portion that is composed of $(Al_xGa_{1-x)y}In_{1-y}P$ (where, $0<x<1$ and $0<y<1$) (For Example: See Column 2 Lines 29-39). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Koike to include the use of a double hetero light emitting layer portion that is composed of $(Al_xGa_{1-x)y}In_{1-y}P$ (where, $0<x<1$

and $0<y<1$) as disclosed in Shakuda because it aids in providing high luminance (For Example: See Column 2 Lines 5-17).

Additionally, since Koike and Shakuda are both from the same field of endeavor (semiconductors), the purpose disclosed by Shakuda would have been recognized in the pertinent art of Koike.

14. Claim 39, as far as understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Koike et al. (U.S. Patent No. 6,620,643) in view of Shimizu et al. (U.S. Patent No. 6,577,073).

In regards to claim 39, Koike fails to disclose the following:

a) a first device and a second device as combined therein, both devices respectively having a double hetero light emitting layer portion composed of compound semiconductors, the first device having an emission wavelength of an emission unit layer contained in an active layer in the double hetero light emitting layer portion of 520 nm to 700 nm, both ends inclusive, and the second device of which having the same of 350 nm to 560 nm, both ends inclusive.

However, Shimizu et al. ("Shimizu") discloses the use of a first device (12) and a second device (11) as combined therein, both devices respectively having a double hetero light emitting layer portion composed of compound semiconductors, the first device having an emission wavelength of an emission unit layer contained in an active layer in the double hetero light emitting layer portion of 520 nm to 700 nm, both ends inclusive, and the second device of which having the same of 350 nm to 560 nm (For Example: See Column 5 Lines 10-19 and Column 6 Lines 18-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Koike to include the use of a first device and a second device as combined therein, both devices respectively having a double hetero light emitting layer portion composed of compound semiconductors, the first device having an

emission wavelength of an emission unit layer contained in an active layer in the double hetero light emitting layer portion of 520 nm to 700 nm, both ends inclusive, and the second device of which having the same of 350 nm to 560 nm, both ends inclusive as disclosed in Shimizu because it aids in providing high luminous efficacy (For Example: See Column 2 Lines 25-30).

Additionally, since Koike and Shimizu are both from the same field of endeavor (semiconductors), the purpose disclosed by Shimizu would have been recognized in the pertinent art of Koike.

Finally, the applicant has not established the critical nature of the first device having an emission wavelength of an emission unit layer contained in an active layer in the double hetero light emitting layer portion of 520 nm to 700 nm, both ends inclusive, and the second device of which having the same of 350 nm to 560 nm, both ends inclusive. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

15. Claim 41, as far as understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Koike et al. (U.S. Patent No. 6,620,643) in view of Shimizu et al. (U.S. Patent No. 6,577,073) and Niwa et al. (U.S. Patent No. 6,542,526).

In regards to claim 41, Koike fails to disclose the following:

a) the double hetero light emitting layer of the first device is composed of $(Al_xGa_{1-x})_yIn_{1-y}P$ (where, $0<x<1$ and $0<y<1$).

However, Shimizu discloses the use of a first device and a second device where the first device is composed of $(Al_xGa_{1-x})_yIn_{1-y}P$ (where, $0<x<1$ and $0<y<1$) (For Example: See Column 5 Lines 10-19 and Column 6 Lines 18-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Koike to include the use of a first device and a second device where the first device is composed of $(Al_xGa_{1-x})_yIn_{1-y}P$ (where, $0<x<1$ and $0<y<1$) as disclosed in Shimizu because it aids in providing high luminous efficacy (For Example: See Column 2 Lines 25-30).

Additionally, since Koike and Shimizu are both from the same field of endeavor (semiconductors), the purpose disclosed by Shimizu would have been recognized in the pertinent art of Koike.

In regards to claim 41, Koike fails to disclose the following:

a) a device is composed of $In_aGa_bAl_{1-a-b}N$ (where, $0<a<1$ and $0<b<1$ and $a+b<1$).

However, Niwa et al. ("Niwa") discloses the use of a device that is composed of InGaAlN (For Example: See Column 18 Lines 30-35). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Koike to include the use of a device that is composed of InGaAlN as disclosed in Niwa because it aids in providing good polarization (For Example: See Column 17 Lines 44-48).

Additionally, since Koike and Niwa are both from the same field of endeavor (semiconductors), the purpose disclosed by Niwa would have been recognized in the pertinent art of Koike.

Conclusion

16. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Tadatomo et al. (U.S. Publication No. 2004/0056258) discloses a luminous element; b) Kuo et al. (U.S. Patent No. 6,608,328) discloses a semiconductor light emitting diode; c) Udagawa (U.S. Patent No. 6,153,894) discloses a light emitting device; d) Tanizawa (U.S. Patent No. 6,657,234) discloses a semiconductor device; e) Chen et al. (U.S. Patent No. 6,163,038) discloses a light emitting diode; and f) McIntosh et al. (U.S. Patent No. 5,684,309) discloses a quantum well.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956

ML
January 14, 2005

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